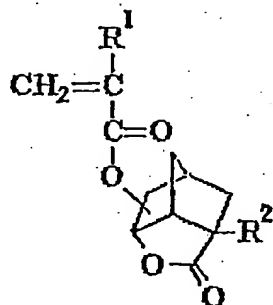


WHAT IS CLAIMED IS:

1. A (meth)acrylate derivative represented by the formula (1):



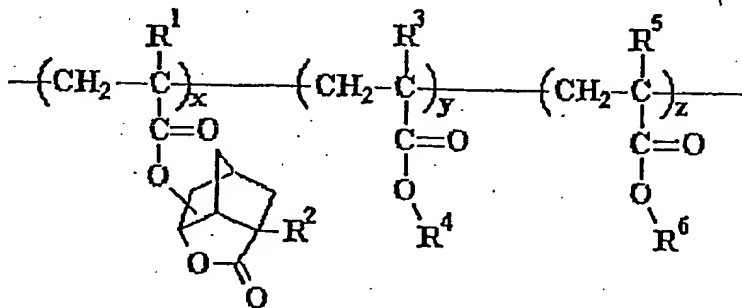
(1)

wherein  $R^1$  and  $R^2$  are each a hydrogen atom or a methyl group.

*Sub*  
*Q2*

2. A polymer which is obtained by polymerizing the (meth)acrylate derivative described in Claim 1, or copolymerizing the (meth)acrylate derivative described in Claim 1 with another polymerizable compound.

3. The polymer according to Claim 2 which is represented by the formula (2) and has a weight-average molecular weight of 2000 to 200000:



wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^5$  are each a hydrogen atom or a methyl group;  $R^4$  is an acid-labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has an acid-labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group, or a hydrocarbon group having 3 to 13 carbon atoms, which has an epoxy group;  $R^6$  is a hydrogen atom, a hydrocarbon group having 1 to 12 carbon atoms, or an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group; and x, y and z are optional values which meet  $x + y + z = 1$ ,  $0 < x \leq 1$ ,  $0 \leq y < 1$  and  $0 \leq z < 1$ .

4. A photoresist material which includes at least the polymer described in Claim 2 and a photo-acid generator for generating an acid by exposure.

5. A photoresist material which includes at least the polymer described in Claim 3 and a photo-acid generator for generating an acid by exposure.

6. A photoresist material according to Claim 4 which further includes a polyhydric alcohol.

7. A photoresist material according to Claim 5 which further includes a polyhydric alcohol.

8. A photoresist composition which comprises 70  
to 99.8% by weight of the polymer described in Claim 2  
and 0.2 to 30% by weight of a photo-acid generator for  
5 generating an acid by exposure.

9. A photoresist composition which comprises 70  
to 99.8% by weight of the polymer described in Claim 3  
and 0.2 to 30% by weight of a photo-acid generator for  
10 generating an acid by exposure.

10. A method for forming a pattern which comprises  
a step of applying the photoresist material described in  
Claim 4 onto a substrate to be worked, a step of exposing  
15 the material to a light having a wavelength of 180 to 220  
nm, a step of carrying out baking, and a step of  
performing development.

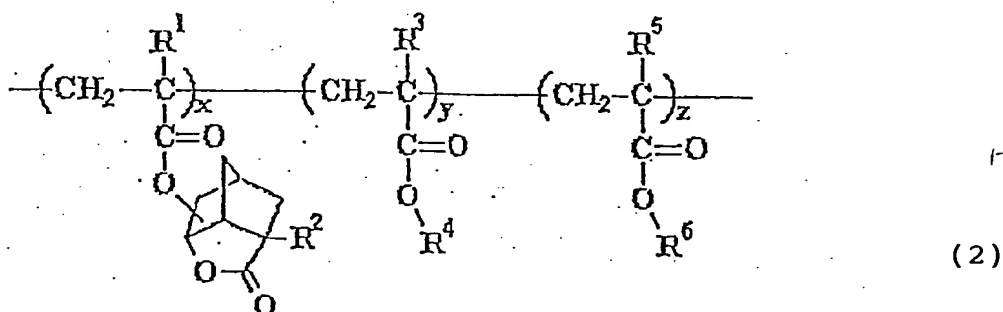
11. A method for forming a pattern which comprises  
20 a step of applying the photoresist material described in  
Claim 5 onto a substrate to be worked, a step of exposing  
the material to a light having a wavelength of 180 to 220  
nm, a step of carrying out baking, and a step of  
performing development.

25 12. The method for forming the pattern according

to Claim 10 wherein the exposure light is an ArF excimer laser light.

13. The method for forming the pattern according to Claim 11 wherein the exposure light is an ArF excimer laser light.

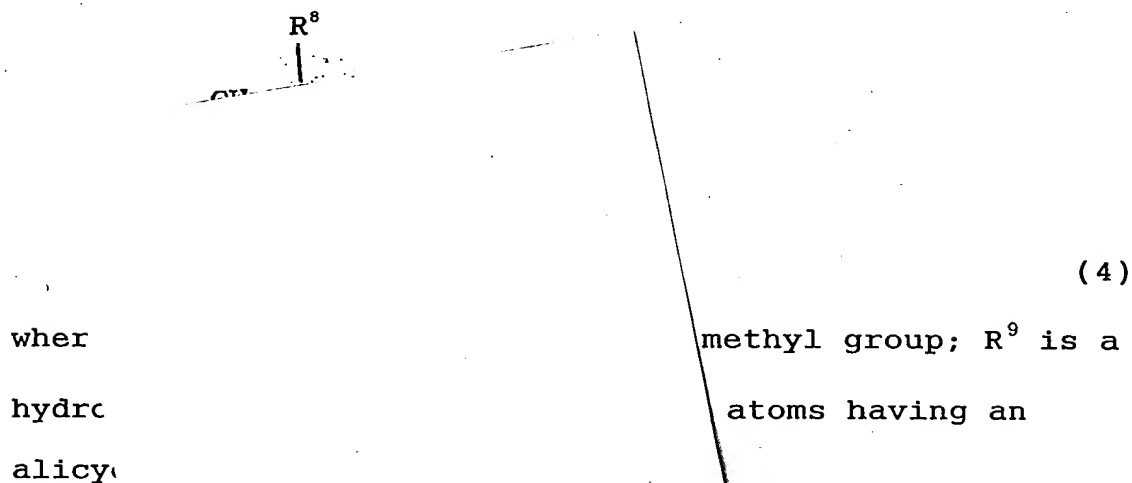
14. A polymer which is represented by the formula (2) and has a weight-average molecular weight of 2000 to 200000:



wherein  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^3$  and  $\text{R}^5$  are each a hydrogen atom or a methyl group;  $\text{R}^4$  is an acid-labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has an acid-labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group, or a hydrocarbon group having 3 to 13 carbon atoms, which has an epoxy group;  $\text{R}^6$  is a hydrogen atom, a hydrocarbon group having 1 to 12 carbon atoms, or an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group; and  $x$ ,  $y$  and  $z$  are optional values.

which meet  $x + y + z = 1$ ,  $0 < x \leq 1$ ,  $0 \leq y < 1$  and  $0 \leq z < 1$ .

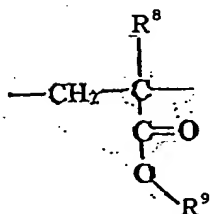
15. A (meth)acrylate derivative having an alicyclic  
5 lactone structure which is represented by the formula  
(4):



16. by polymerizing the  
(meth)a Claim 15, or  
copolyme vative described in  
Claim 15 compound and has a  
20 weight-av to 200000.

17. In resist, the solubility to an  
alkaline aqueous solution of which increases due to the  
decomposition of an acid-decomposable group thereof by an  
25 action of an acid, said resin is the resin for resist

having a (meth)acrylate unit of an alicyclic lactone structure represented by the formula (3):



(3)

wherein R<sup>8</sup> is a hydrogen atom or a methyl group, and R<sup>9</sup> is a hydrocarbon group of 7 to 16 carbon atoms having an alicyclic lactone structure.

18. The resin for resist according to Claim 17 wherein said resin is the polymer of Claim 2 or Claim 14.

19. A photoresist material which includes at least the polymer described in Claim 14 or 16 and a photo-acid generator for generating an acid by exposure.

20. The photoresist material according to Claim 19 which further includes a polyhydric alcohol.

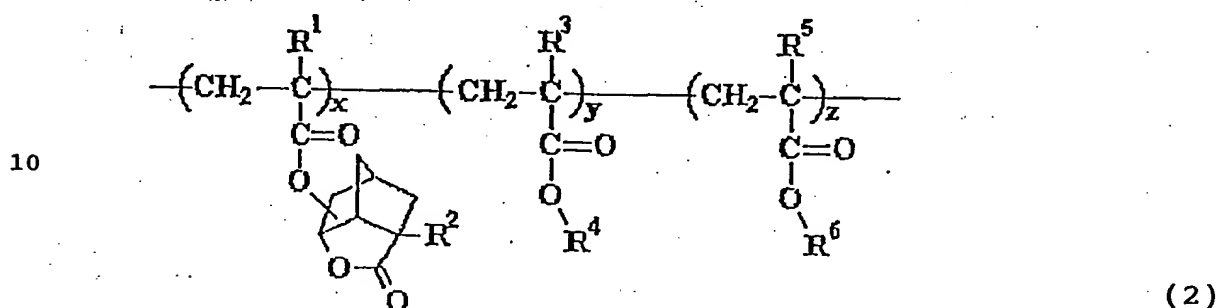
21. A photoresist composition which at least comprises 70 to 99.8% by weight of the polymer described in Claim 17 or 18 and 0.2 to 30% by weight of a photo-acid generator for generating an acid by exposure.

22. A method for forming a pattern which comprises  
at least a step of applying the photoresist composition  
described in Claim 21 onto a substrate to be worked, a  
5 step of exposing the composition to a light having a  
wavelength of 180 to 220 nm, a step of carrying out  
baking, and a step of performing development.

23. The method for forming the pattern according to  
10 Claim 22 wherein the exposure light is an ArF excimer  
laser light.

# ABSTRACT OF THE DISCLOSURE

There are here disclosed a photoresist material for lithography using a light of 220 nm or less which comprises at least a polymer represented by the following  
 5 formula (2) and a photo-acid generator for generating an acid by exposure:

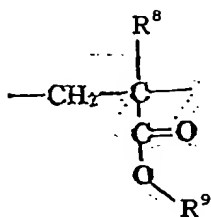


wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^5$  are each a hydrogen atom or a  
 15 methyl group;  $R^4$  is an acid-labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has an acid labile group, an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group, or a hydrocarbon group having 3 to 13 carbon atoms, which  
 20 has an epoxy group;  $R^6$  is a hydrogen atom, a hydrocarbon group having 1 to 12 carbon atoms, or an alicyclic hydrocarbon group having 7 to 13 carbon atoms, which has a carboxyl group;  $x$ ,  $y$  and  $z$  are optional values which meet  $x + y + z = 1$ ,  $0 < x \leq 1$ ,  $0 \leq y < 1$  and  $0 \leq z < 1$ ;  
 25 and a weight-average molecular weight of the polymer is



in the range of 2000 to 200000, and a resin having a (meth)acrylate unit of an alicyclic lactone structure represented by the formula (3):

5



(3)

10 wherein R<sup>8</sup> is a hydrogen atom or a methyl group, and R<sup>9</sup> is a hydrocarbon group of 7 to 16 carbon atoms having an alicyclic lactone structure.